DETECTION OF VOLATILE ORGANIC COMPOUNDS USING QUARTZ CRYSTAL MICROBALANCE SENSOR ARRAY AND ARTIFICIAL NEURAL NETWORK

Abstract

This paper presents the design and development of an odour sensing system based on a Quartz Crystal Microbalance (QCM) odour-sensor array and an artificial neural network (ANN) for the identification of some of the volatile organic compounds (VOCs) such as Acetone, Benzene, Chloroform, Ethanol and Methanol. The QCM sensors were developed using PVC-blended lipids as sensing materials. A home-built data acquisition and embedded pattern recognition system were developed using the Xilinx IC and AT89C52 Microcontroller. In addition, user interface software was developed to control the vapours flow system, data acquisition, process the acquired data and display the detected vapours using optimised neural network. The performance of this odour sensing system for VOCs emission detection was tested under laboratory conditions to determine its ability to detect single odour compound emission. Simulation and experimental results using an optimised neural network system confirmed that the proposed odour recognition system was effective in identifying the tested VOCs.